1997 Study

REVIEW OF TRUST/NON-TRUST GROUND WATER LINE

The trust/non-trust ground water line was established by IDWR hydrogeologists in 1986 as a result of the negotiated 1984 Swan Falls Agreement between Idaho Power Company and the State of Idaho. This agreement defined conditions under which Idaho Power Company's rights at Swan Falls receive natural flow from above and below the Snake River at Milner. The trust/non-trust ground water areas are shown in Figure 2. The two areas are separated by an administrative boundary which runs along an apparent ground water ridge that divides the direction of ground water movement to the Snake River above and below Milner. As shown in Figure 3, this line runs in a northeast to southwest direction across the ESPA creating the two areas. The upper section represents the area where ground water is considered tributary below Milner (trust water); the bottom section represents the area where ground water is considered tributary above Milner (non-trust water).

The trust/non-trust line was originally established based on over 400 water level measurements taken in 1980 by the USGS (Garabedian, 1992) for the Regional Aquifer System Analysis Study (RASA) and, in local areas, on other pre-1986 data. The line was first drawn perpendicular to ground water contours, but for administrative purposes was moved to follow public land survey section boundaries. The Settlement Agreement called for a review of the line using more recent data since conditions had possibly changed from 1980 to 1993. A review of the trust/non-trust line across the ESPA was included by the technical committee as a study element.

Water level data in a zone approximately 25 miles wide along the original line were plotted using 1993 USGS records. Two contour maps were drawn, one for the spring of 1993 using 66 observation wells (Figure 3), and one for the fall of 1993 using 41 wells, and the administrative trust/non-line was plotted on each. These two maps show that the 1993 contours remain relatively perpendicular to the line in both spring and fall. Although there were some minor inconsistencies, likely due to differences in data densities, neither of the two maps suggest a change from the original line is justified.

Figure 2. Trust & Non Trust Groundwater Areas

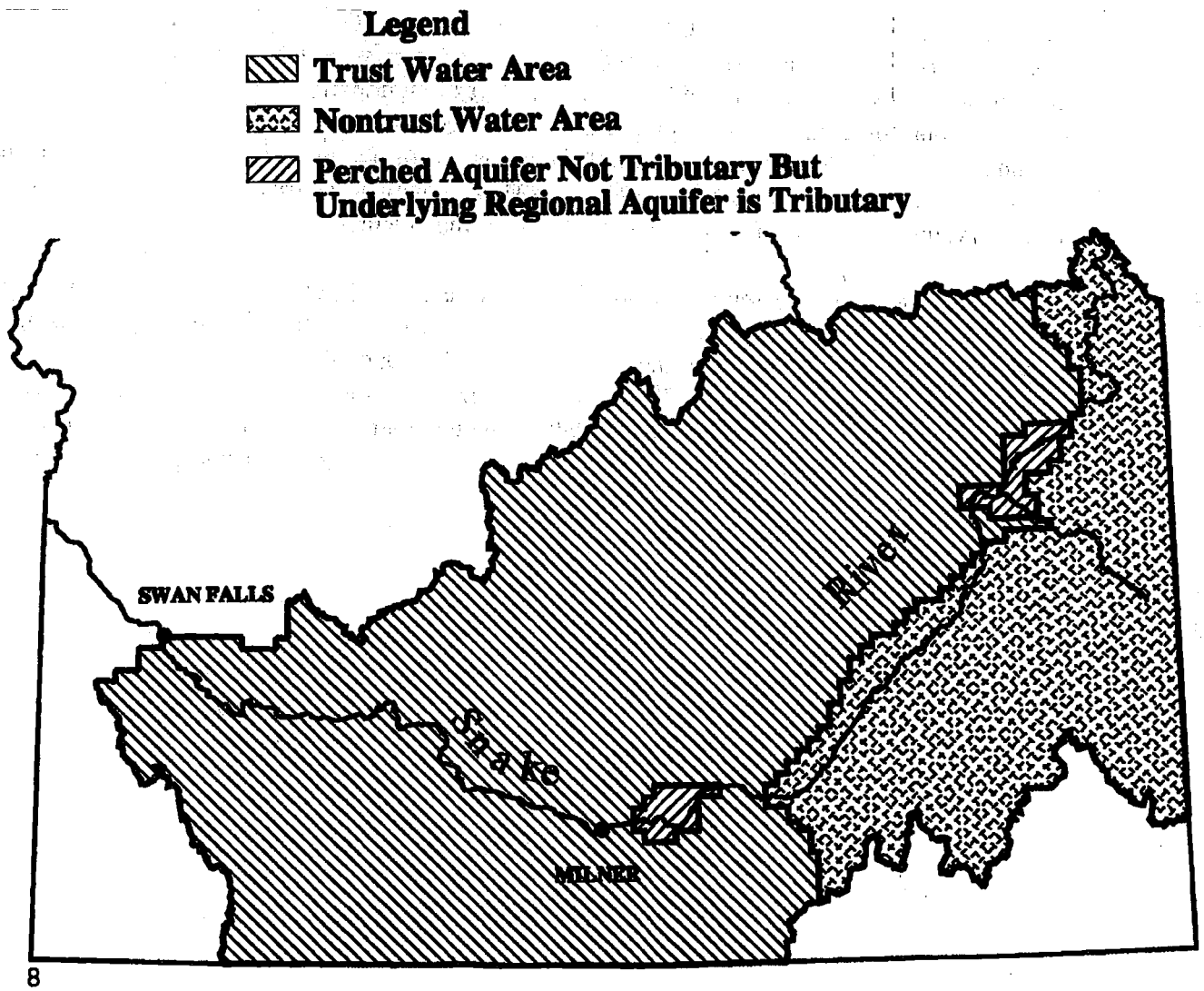
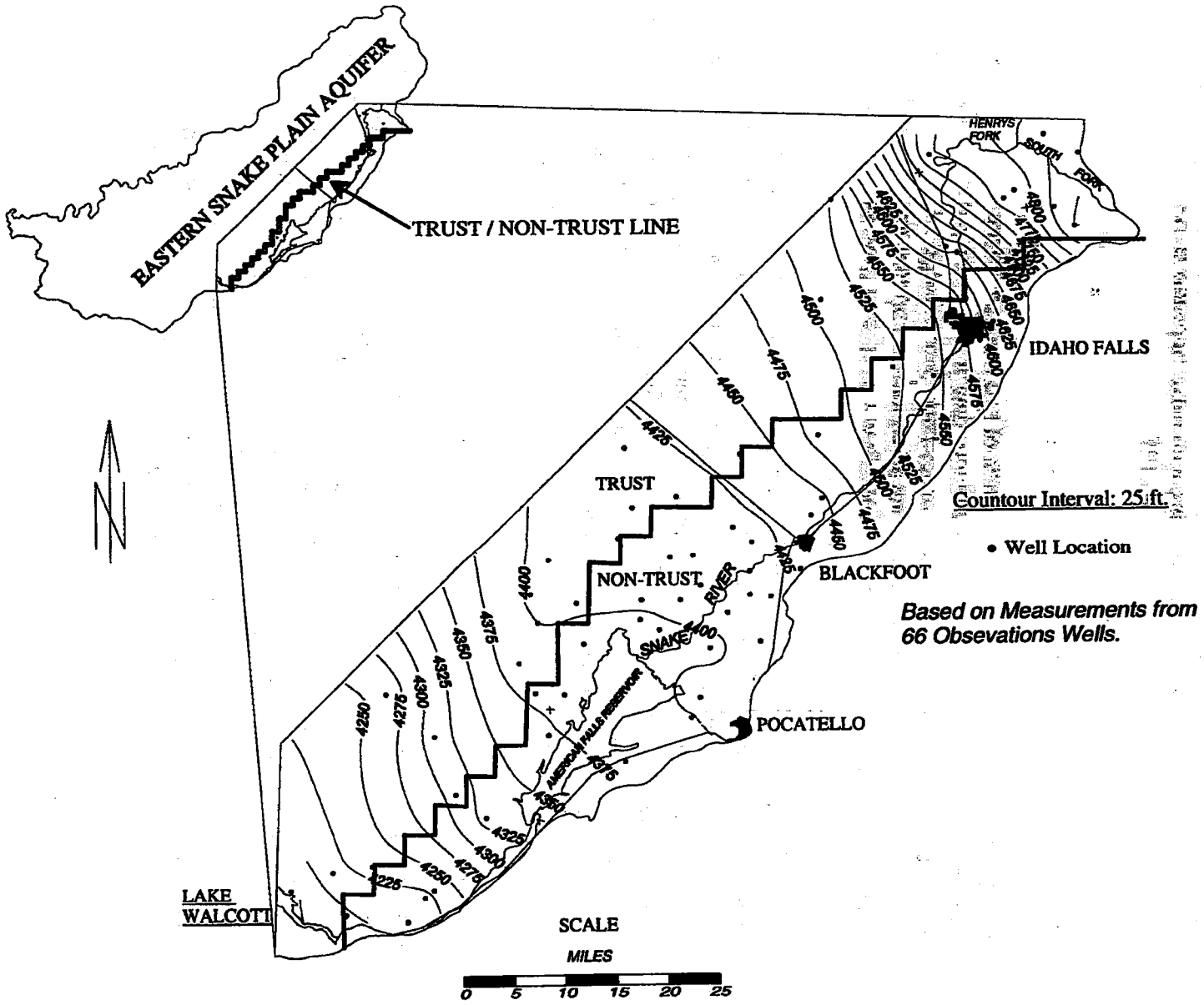


Figure 3. Trust/ Non-Trust Line Overlying ESPA
and Spring 1993 Ground Water Elevations



IDWR/UI ESPA GROUND WATER FLOW MODEL

This is a brief description of the IDWR/UI ground water flow model and its adaptation to the ESPA. A general outline description of the model is contained in Appendix B. A detailed description of the model is provided by Johnson and Brockway, 1983.

PROGRAMS

The IDWR/UI ground water flow model consists of two separate programs. The first is a recharge program which summarizes and processes input data for each component of the aquifer water balance and generates a combined recharge or discharge (net recharge) source term for each grid cell for each timestep. Water balance elements are precipitation, crop consumptive use, deep percolation from surface irrigation, tributary valley underflow and surface flow, point source pumping and injection wells, and streambed gains and losses.

A second program simulates aquifer response to net recharge, given estimates of geohydrologic parameters. The model simulates two-dimensional flow. Head values are calculated by an **iterative** solution of finite difference ground water flow equations (Johnson and Brockway, 1983). The model computes change in aquifer storage resulting from changes in ground water surface elevation and also computes reach inflow and outflow between surface streams and the aquifer. The simulation program contains a calibration routine which allows either automatic or manual adjustment of parameters in order to match water table head values, gradients, and spring discharge at reference timesteps.

MODEL BOUNDARIES

The IDWR/UI ground water flow model was adapted to the ESPA by establishing boundaries around the ESPA area previously defined by the USGS shown in Figure 4. Model boundaries do not exactly correspond to USGS ESPA boundaries for reasons of hydrologic interpretation. The encompassed area (Figure 5) was overlain with a 5 km grid and the model boundary was characterized as either fixed head (hydraulically connected to the river) or fixed flow (no flow or constant flow). Hydraulically connected fixed-head cells (aquifer discharge/recharge areas) were chosen along the southern boundary of the Snake River from above American Falls Reservoir to Minidoka Reservoir and from Kimberly to King Hill. These two reaches represent the major spring discharge areas from the ESPA. All other boundaries are specified as either no flow or, where tributary valley underflow occurs, fixed flow.

Figure 4. Eastern Snake Plain Aquifer and Model Boundary

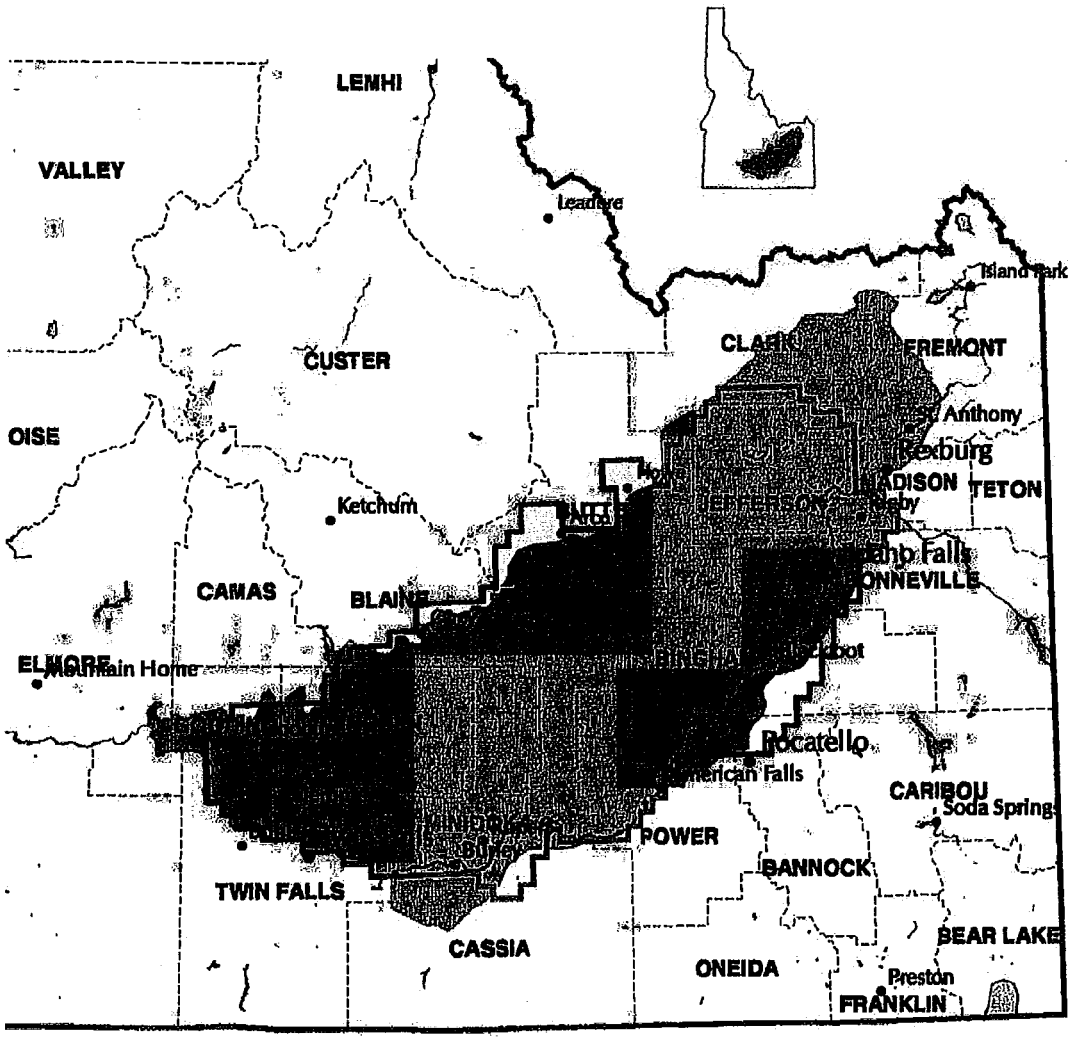
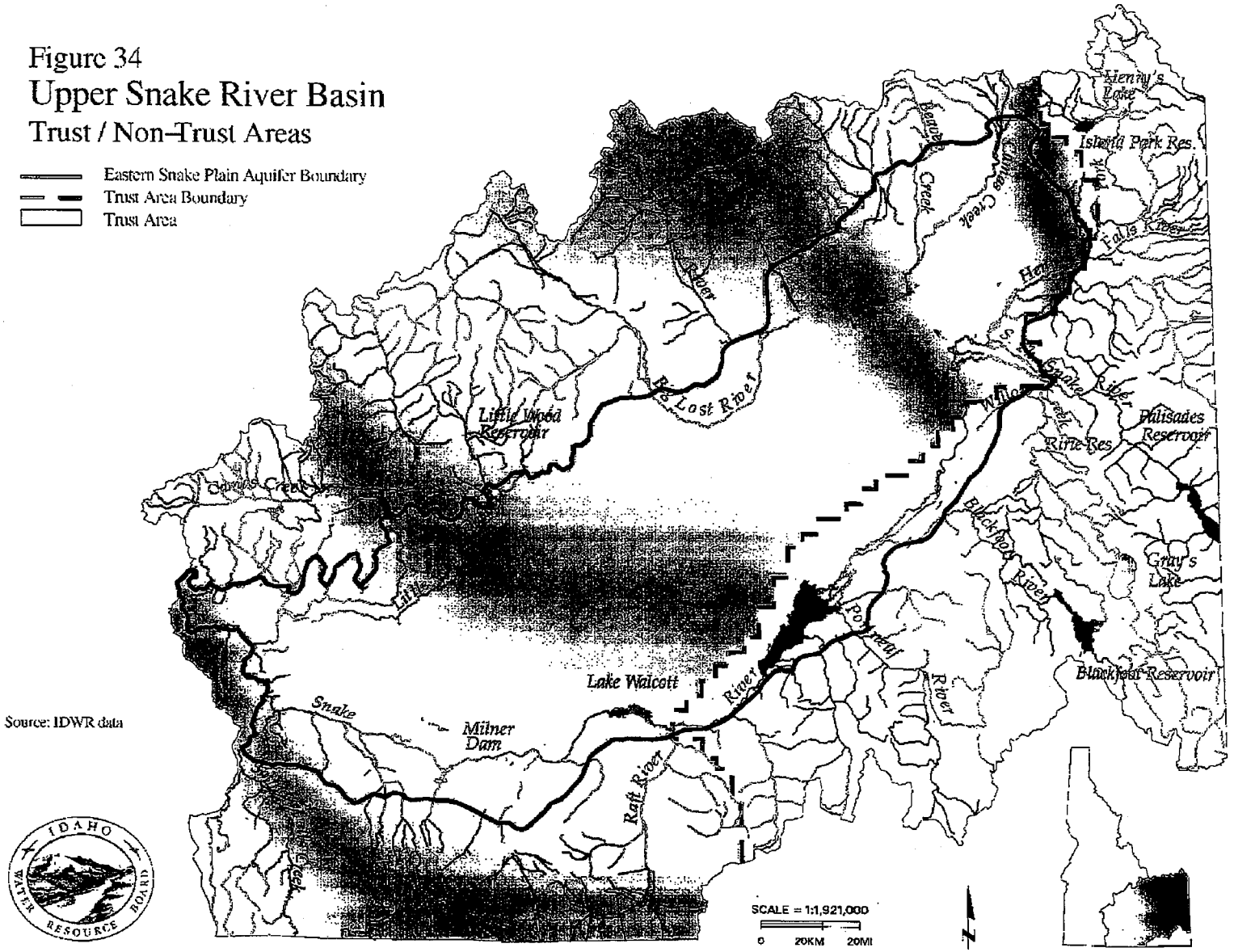


Figure 34

Upper Snake River Basin

Trust / Non-Trust Areas



Source: IDWR data

1978 Hydrology Study (Final)